

REMARKS

Favorable reconsideration of this application is requested in view of the following remarks.

Claims 28 and 43 have been canceled without prejudice. Claim 7 has been amended editorially.

Claim 28 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claim 28 has been canceled, and accordingly, this rejection is moot and should be withdrawn. Applicants do not concede the correctness of the rejection.

Claims 1, 3-7, 9-12, 17, 18, 20, and 26 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552). Applicants respectfully traverse this rejection.

Kawamura I discloses use of Na flux solution system to grow GaN crystals (see page L4, the left coln., third paragraph). However, Kawamura I fails to disclose that the flux is stirred by rocking the reaction vessel as claim 1 requires. When the flux is stirred by rocking, flatness of a surface of the Group-III-element nitride single crystals is greatly increased as shown in Fig. 7 of "Growth of high-quality large GaN crystal by Na flux LPE method" ("SPIE reference") presented at the conference of SPIE Photonics West 2009 by Applicants attached hereto. A photo (a) of Fig. 7 of the SPIE reference shows a crystal prepared by a method of the Kawamura I reference, and a photo (b) shows a crystal prepared by a method of claim 1 (see page 6). The improvement of the flatness of the crystal surface is also clear in Fig. 4 of the present application when compared with Fig. 1 of the Kawamura I reference. See also Fig. 11 at page 7 of "Growth of large GaN single crystals with low dislocation density using the liquid phase epitaxy technique" (Japanese Association for Crystal Growth Vol. 32, No. 1 March, 2005) submitted by Applicants as attached hereto.

Yamada discloses that a growth chamber is rotated (see coln. 4, lines 34-39). In addition, Yamada discloses a substrate, which is arranged obliquely to the horizontal axis and thus, Yamada needs to reduce an effect of gravity and improve a homogeneous epitaxial growth layer with uniform thickness (see Figs. 2-3 and coln. 5, lines 4-13). Fig. 1 of Kawamura I, which shows more growth of the crystal in the horizontal direction than that in the vertical direction, suggests that the substrate of Kawamura I is placed parallel to the horizontal axis rather than being placed obliquely to the horizontal axis (see Figs. 1 and 3 and page L4, right coln. first para. to L5, line 5 of Kawamura 1 and see also, Fig. 6 of Yamada). Yamada further discloses that an angular movement of the growth chamber promotes supply of the solute, accelerates the growth rate of the crystals, and thus increases uniformity of thickness and quality (see coln. 5, lines 21-27). Even if the method of Yamada including a step of rotating the chamber increases the uniformity of the crystal in a vertical direction, the method of Yamada seems not increase the thickness of the crystal, i.e., growth of the crystal (see Figs. 5 and 6). Accordingly, there is no reasonable basis to combine Kawamura I, in which the substrate is placed horizontally and has a minimal effect of gravity, with Yamada, in which the substrate is placed obliquely to the horizontal axis and is influenced by gravity, in order to promote growth of the crystals. Further, the resulting from the rocking is not suggested by either reference.

Accordingly, claim 1 is distinguished from Kawamura I in view of Yamada, and the rejection should be withdrawn.

Claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552) and further in view of D'Evelyn et al. (U.S. Patent No. 6,398,867). Applicants respectfully traverse this rejection.

Claim 8 is distinguished from Kawamura I in view of Yamada for at least the same reasons as discussed for claim 1 above. D'Evelyn discloses a seed crystal that is placed parallel to the horizontal axis (see Fig. 5), and neither discloses a step of stirring

the flux by rocking nor suggests the unexpected improvement of the surface flatness of the crystal by rocking. Thus, D'Evelyn does not remedy the deficiencies of Kawamura I in view of Yamada, and the rejection should be withdrawn. Applicants do not concede the correctness of the rejection for the features of claim 8.

Claim 14 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552), and further in view of Kawamura et al. (Synthesis of bulk GaN single crystals using Na-Ca flux) (Kawamura II). Applicants respectfully traverse this rejection.

Claim 14 is distinguished from Kawamura I in view of Yamada for at least the same reasons as discussed for claim 1 above. Kawamura II neither discloses a step of stirring the flux by rocking nor suggests the unexpected improvement of the surface flatness of the crystal by rocking, and Kawamura II does not remedy the deficiencies of Kawamura I in view of Yamada. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection for the features of claim 14.

Claims 21 and 24-25 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552), and further in view of Shibata et al. (U.S. Patent No. 6,270,569). Applicants respectfully traverse this rejection.

Claims 21, 24, and 25 are distinguished from Kawamura I in view of Yamada for at least the same reasons as discussed for claim 1 above. Shibata neither discloses a step of stirring the flux by rocking nor suggests the unexpected improvement of the surface flatness of the crystal by rocking, and Shibata does not remedy the deficiencies of Kawamura I in view of Yamada. Thus, the rejection of claims 21, 24, and 25 should be withdrawn. Applicants do not concede the correctness of the rejection for the features of claims 21, 24, and 25.

Claim 27-28 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552), and further in view of Hawrylo et al. (U.S. Patent No.3,811,963). Applicants respectfully traverse this rejection.

Claim 28 has been canceled. Claim 27 is distinguished from Kawamura I in view of Yamada for at least the same reasons discussed for claim 1 above. Hawrylo neither discloses a step of stirring the flux by rocking nor suggests the unexpected improvement of the surface flatness of the crystal by rocking, and Hawrylo does not remedy the deficiencies of Kawamura I in view of Yamada. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection for the features of claims 27 and 28.

Claim 30 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a large GaN single crystal using the liquid phase epitaxy (LPE) technique") (Kawamura I) in view of Yamada et al. (U.S. Patent No. 5,366,552), and further in view of Inoue et al. (Japanese Examined Patent Application Publication No. 75-11870). Applicants respectfully traverse this rejection.

Claim 30 is distinguished from Kawamura I in view of Yamada for at least the same reasons discussed for claim 1 above. Inoue neither discloses a step of stirring the flux by rocking nor suggests the unexpected improvement of the surface flatness of the crystal by rocking, and Inoue does not remedy the deficiencies of Kawamura I in view of Yamada. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection for the features of claim 30.

Claims 1, 3-12, 14, 17-18, 20-21, 24-28, and 30 have been rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-36 of copending Application No. 11/661,013. Applicants respectfully traverse this rejection.

The express abandonment of Application No. 11/661,013 was submitted on February 13, 2009. Accordingly, this rejection is moot and should be withdrawn. Applicants do not concede the correctness of this rejection.

In view of the above, Applicants request reconsideration of the application in the form of a Notice of Allowance.

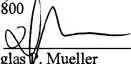


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